



DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[RTID 0648- XB760]

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Geophysical Surveys in the Southeastern Gulf of Mexico

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; issuance of an incidental harassment authorization (IHA).

SUMMARY: In accordance with the regulations implementing the Marine Mammal Protection Act (MMPA) as amended, notification is hereby given that NMFS has issued an IHA to Scripps Institution of Oceanography (Scripps) to incidentally harass marine mammals during marine geophysical surveys in the southeastern Gulf of Mexico.

DATES: This authorization is effective from June 29, 2022 through June 28, 2023.

FOR FURTHER INFORMATION CONTACT: Amy Fowler, Office of Protected Resources, NMFS, (301) 427-8401. Electronic copies of the application and supporting documents, as well as a list of the references cited in this document, may be obtained online at: <https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act>. In case of problems accessing these documents, please call the contact listed above.

SUPPLEMENTARY INFORMATION:

Background

The MMPA prohibits the “take” of marine mammals, with certain exceptions. sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce (as delegated to NMFS) to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in

a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are proposed or, if the taking is limited to harassment, a notice of a proposed incidental harassment authorization is provided to the public for review.

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for taking for subsistence uses (where relevant). Further, NMFS must prescribe the permissible methods of taking and other “means of effecting the least practicable adverse impact” on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stocks for taking for certain subsistence uses (referred to in shorthand as “mitigation”); and requirements pertaining to the mitigation, monitoring and reporting of the takings are set forth.

The definitions of all applicable MMPA statutory terms cited above are included in the relevant sections below.

Summary of Request

On March 17, 2020, NMFS received a request from Scripps for an IHA to take marine mammals incidental to low-energy geophysical surveys in the southeastern Gulf of Mexico, initially planned to occur in summer 2020. The application was deemed adequate and complete on May 26, 2020. On June 9, 2020, Scripps notified NMFS that the proposed survey had been postponed and tentatively rescheduled for summer 2021. On April 8, 2021, Scripps notified NMFS that the survey had been further postponed and is now expected to occur in July-August 2022. NMFS reviewed recent draft Stock Assessment Reports (SARs) and other scientific literature, and determined that neither this nor any other new information affects which species or stocks have the potential to

be affected, the potential effects to marine mammals and their habitat as described in the IHA application, or any other aspect of the analysis. Therefore, NMFS determined that Scripps' IHA application remained adequate and complete. Scripps' request is for take of 20 species of marine mammals by Level B harassment only. Neither Scripps nor NMFS expects serious injury or mortality to result from this activity and, therefore, an IHA is appropriate.

Description of Activity

Overview

Scripps plans to support a research project that involves low-energy seismic surveys in the Gulf of Mexico during summer 2022. The study will be conducted on the R/V *Justo Sierra*, owned by Universidad Nacional Autónoma de México (UNAM), using a portable multi-channel seismic (MCS) system operated by marine technicians from Scripps. The survey will use a pair of low-energy Generator-Injector (GI) airguns with a total discharge volume of 90 cubic inches (in³). The surveys will take place within the Exclusive Economic Zones (EEZs) of Mexico and Cuba in the southeastern Gulf of Mexico.

Dates and Duration

The specific dates of the survey have not been determined but the cruise is expected to occur in July to August 2022. The research cruise is expected to consist of 15 days at sea, including ~12 days of seismic operations (10 planned days and 2 contingency days) and ~3 days of transit. R/V *Justo Sierra* will depart from Tampamochaco, Mexico and return to Progreso, Mexico after the program is completed.

Specific Geographic Region

The planned surveys take place in the Gulf of Mexico between ~22°-25° N and 83.8°-88° W (see Figure 1). Seismic acquisition will occur in two primary survey areas. The Yucatán Channel survey area is located in the deep-water channel between the

Campeche and Florida escarpments, within the EEZ of Cuba in water depths ranging from ~1,500 to 3,600 meters (m; 4,921 to 11,811 feet (ft)). The Campeche Bank survey area is located in the northeastern flank of the Campeche escarpment, within the EEZs of Cuba and Mexico in waters ranging in depth from ~110 to 3,000 m (361 to 9,843 ft).

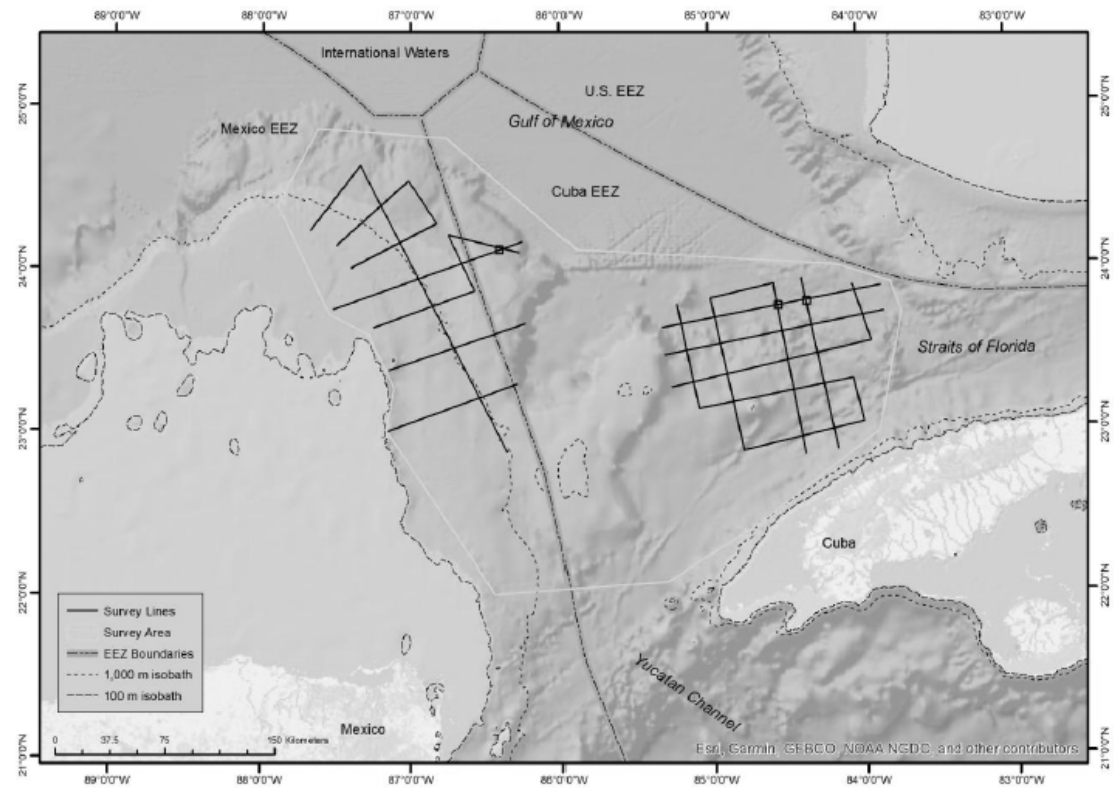


Figure 1. Location of the planned low-energy seismic surveys in the southeastern Gulf of Mexico

A detailed description of the planned geophysical survey project is provided in the **Federal Register** notice for the proposed IHA (86 FR 71427; December 16, 2021). Since that time, no changes have been made to the planned survey activities. Therefore, a detailed description is not provided here. Please refer to that **Federal Register** notice for the description of the specified activity.

Mitigation, monitoring, and reporting measures are described in detail later in this document (please see **Mitigation** and **Monitoring and Reporting**).

Comments and Responses

A notice of proposed IHA was published in the **Federal Register** on December 16, 2021 (86 FR 71427). That notice described, in detail, Scripps' activity, the marine mammal species that may be affected by the activity, and the anticipated effects on marine mammals. During the 30-day public comment period, NMFS did not receive any public comments.

Description of Marine Mammals in the Area of Specified Activities

Sections 3 and 4 of the application summarize available information regarding status and trends, distribution and habitat preferences, and behavior and life history, of the potentially affected species. Additional information regarding population trends and threats may be found in NMFS's SARs (<https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments>) and more general information about these species (e.g., physical and behavioral descriptions) may be found on NMFS's website (<https://www.fisheries.noaa.gov/find-species>).

Table 1 lists all species or stocks for which take is expected and has been authorized for this action, and summarizes information related to the population or stock, including regulatory status under the MMPA and Endangered Species Act (ESA) and potential biological removal (PBR), where known. For taxonomy, we follow Committee on Taxonomy (2021). PBR is defined by the MMPA as the maximum number of animals,

not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (as described in NMFS's SARs). While no mortality is anticipated or authorized here, PBR and annual serious injury and mortality from anthropogenic sources are included here as gross indicators of the status of the species and other threats.

Marine mammal abundance estimates presented in this document represent the total number of individuals that make up a given stock or the total number estimated within a particular study or survey area. NMFS's stock abundance estimates for most species represent the total estimate of individuals within the geographic area, if known, that comprises that stock. For most species, stock abundance estimates are based on sightings within the U.S. EEZ, however for some species, this geographic area may extend beyond U.S. waters. Other species may use survey abundance estimates. Survey abundance (as compared to stock or species abundance) is the total number of individuals estimated within the survey area, which may or may not align completely with a stock's geographic range as defined in the SARs. These surveys may also extend beyond U.S. waters. In this case, the planned survey area outside of the U.S. EEZ does not necessarily overlap with the ranges for stocks managed by NMFS. However, we assume that individuals of these species that may be encountered during the survey may be part of those stocks.

All managed stocks in this region are assessed in NMFS's U.S. Atlantic and Gulf of Mexico SARs (*e.g.*, Hayes *et al.*, 2021). All values presented in Table 1 are the most recent available at the time of publication and are available in the 2020 SARs (Hayes *et al.*, 2021) and draft 2021 SARs (available online at: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/draft-marine-mammal-stock-assessment-reports>).

For the majority of species potentially present in the specified geographical region, NMFS has designated only a single generic stock (*i.e.*, “Gulf of Mexico”) for management purposes, although there is currently no information to differentiate the stock from the Atlantic Ocean stock of the same species, nor information on whether more than one stock may exist in the GOM (Hayes *et al.*, 2017).

Table 1. Marine Mammals That Could Occur in the Survey Area

Common name	Scientific name	Stock	ESA/MMPA status; Strategic (Y/N) ¹	Stock abundance (CV, N _{min} , most recent abundance survey) ²	PBR	Annual M/SI ³	Gulf of Mexico population abundance (Roberts <i>et al.</i> , 2016) ⁴
Order Cetartiodactyla – Cetacea – Superfamily Odontoceti (toothed whales, dolphins, and porpoises)							
Family Physeteridae							
Sperm whale	<i>Physeter macrocephalus</i>	Gulf of Mexico	E/D; Y	1,180 (0.22, 983, 2018)	2	9.6	2,207
Family Kogiidae							
Pygmy sperm whale ⁶	<i>Kogia breviceps</i>	Gulf of Mexico	-/-; N	336 (0.35, 253, 2018)	2.5	31	4,373
Dwarf sperm whale ⁶	<i>Kogia sima</i>						
Family Ziphiidae (beaked whales)							
Cuvier's beaked whale ⁶	<i>Ziphius cavirostris</i>	Gulf of Mexico	-/-; N	18 (0.75, 10, 2018)	0.1	5.2	3,768
Blainville's beaked whale ⁶	<i>Mesoplodon densirostris</i>	Gulf of Mexico	-/-; N	98 (0.46, 68, 2018)	0.7	5.2	
Gervais' beaked whale ⁶	<i>Mesoplodon europaeus</i>	Gulf of Mexico	-/-; N	20 (0.98, 10, 2018)	0.1	5.2	
Family Delphinidae							
Rough-toothed dolphin	<i>Steno bredanensis</i>	Gulf of Mexico	-/-; N	unknown (n/a, unknown, 2018)	undetermined	39	4,853
Bottlenose dolphin	<i>Tursiops truncatus</i>	Gulf of Mexico Oceanic	-/-; N	7,462 (0.31, 5,769, 2018)	58	32	176,108 ⁶
Pantropical spotted dolphin	<i>Stenella attenuata</i>	Gulf of Mexico	-/-; N	37,195 (0.24, 30,377, 2018)	304	241	102,361
Atlantic spotted dolphin	<i>Stenella frontalis</i>	Gulf of Mexico	-/-; N	21,506 (0.26, 17,339, 2018)	166	36	74,785

Spinner dolphin	<i>Stenella longirostris</i>	Gulf of Mexico	-/-; Y	2,991 (0.54, 1,954, 2018)	20	113	25,114
Clymene dolphin	<i>Stenella clymene</i>	Gulf of Mexico	-/-; Y	513 (1.03, 250, 2018)	2.5	8.4	11,895
Striped dolphin	<i>Stenella coeruleoalba</i>	Gulf of Mexico	-/-; Y	1,817 (0.56, 1,172, 2018)	12	13	5,229
Fraser's dolphin	<i>Lagenodelphis hosei</i>	Gulf of Mexico	-/-; N	213 (1.03, 104, 2018)	1	Unknown	1,665
Risso's dolphin	<i>Grampus griseus</i>	Gulf of Mexico	-/-; N	1,974 (0.46, 1,368, 2018)	14	5.3	3,764
Melon-headed whale	<i>Peponocephala electra</i>	Gulf of Mexico	-/-; N	1,749 (0.68, 1,039, 2018)	10	9.5	7,003
Pygmy killer whale	<i>Feresa attenuata</i>	Gulf of Mexico	-/-; N	613 (1.15, 283, 2018)	2.8	1.6	2,126
False killer whale	<i>Pseudorca crassidens</i>	Gulf of Mexico	-/-; N	494 (0.79, 276, 2018)	2.8	Unknown	3,204
Killer whale	<i>Orcinus orca</i>	Gulf of Mexico	-/-; N	267 (0.75, 152, 2018)	1.5	Unknown	185
Short-finned pilot whale	<i>Globicephalus macrorhynchus</i>	Gulf of Mexico	-/-; N	1,321 (0.43, 934, 2018)	7.5	3.9	1,981

¹ Endangered Species Act (ESA) status: Endangered (E), Threatened (T)/MMPA status: Depleted (D). A dash (-) indicates that the species is not listed under the ESA or designated as depleted under the MMPA. Under the MMPA, a strategic stock is one for which the level of direct human-caused mortality exceeds PBR or which is determined to be declining and likely to be listed under the ESA within the foreseeable future. Any species or stock listed under the ESA is automatically designated under the MMPA as depleted and as a strategic stock.

² NMFS marine mammal stock assessment reports online at: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/draft-marine-mammal-stock-assessment-reports>. CV is coefficient of variation; Nmin is the minimum estimate of stock abundance. In some cases, CV is not applicable.

³ These values, found in NMFS's SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (e.g., commercial fisheries, ship strike). Annual mortality/serious injury (M/SI) often cannot be determined precisely and is in some cases presented as a minimum value or range. A CV associated with estimated mortality due to commercial fisheries is presented in some cases.

⁴ This information represents species- or guild-specific best abundance estimate predicted by habitat-based cetacean density models (Roberts et al., 2016). These models provide the best available scientific information regarding predicted density patterns of cetaceans in the U.S. Gulf of Mexico, and we provide the corresponding abundance predictions as a point of reference. Total abundance estimates were produced by computing the mean density of all pixels in the modeled area and multiplying by its area. For those taxa where a density surface model predicting abundance by month was produced, the maximum mean seasonal abundance was used. For those taxa where abundance is not predicted by month, only mean annual abundance is available. For more information, see <https://seamap.env.duke.edu/models/Duke/GOM/>.

⁵ Abundance estimates are in some cases reported for a guild or group of species when those species are difficult to differentiate at sea. Similarly, the habitat-based cetacean density models produced by Roberts et al. (2016) are based in part on available observational data which, in some cases, is limited to genus or guild in terms of taxonomic definition. NMFS's SARs present pooled abundance estimates for *Kogia* spp. and *Mesoplodon* spp., while Roberts et al. (2016) produced density models to genus level for *Kogia* spp. and as a guild for beaked whales (*Ziphius cavirostris* and *Mesoplodon* spp.). Finally, Roberts et al. (2016) produced a density model for bottlenose dolphins that does not differentiate between oceanic, shelf, and coastal stocks.

In Table 1 above, we report two sets of abundance estimates: those from NMFS SARs and those predicted by Roberts *et al.* (2016). Please see the table footnotes for more detail. As discussed in the notice of proposed IHA (86 FR 71427; December 16, 2021), we expect that the Roberts *et al.* (2016) estimates are generally more realistic and, for these purposes, represent the best available information. For purposes of assessing estimated exposures relative to abundance—used in this case to understand the scale of the predicted takes compared to the population—we generally believe that the Roberts *et al.* (2016) abundance predictions are most appropriate because they were used to generate the exposure estimates and therefore provide the most relevant comparison (see **Estimated Take**). Roberts *et al.* (2016) represents the best available scientific information regarding marine mammal occurrence and distribution in the Gulf of Mexico.

As the planned survey lines are outside of the U.S. EEZ, they do not directly overlap with the defined stock ranges within the Gulf of Mexico (Hayes *et al.*, 2021). However, some of the survey lines occur near the U.S. EEZ, and the distribution and abundance of species in U.S. EEZ waters are assumed representative of those in the survey area. As indicated above, all 20 species (with 20 representative stocks in the northern Gulf of Mexico) in Table 1 temporally and spatially co-occur with the activity to the degree that take is reasonably likely to occur, and we have authorized it. All species that could potentially occur in the planned survey areas are included in Table 2 of the IHA application.

A detailed description of the species likely to be affected by the geophysical surveys, including brief introductions to the species and relevant stocks as well as available information regarding population trends and threats, and information regarding local occurrence, were provided in Scripps' IHA application and summarized in the **Federal Register** notice for the proposed IHA (86 FR 71427; December 16, 2021); since that time, we are not aware of any changes in the status of these species or stocks;

therefore, detailed descriptions are not provided here. Please refer to that **Federal Register** notice and the IHA application for these descriptions. Please also refer to NMFS' website (www.nmfs.noaa.gov/pr/species/mammals/) for generalized species accounts.

Marine Mammal Hearing

Hearing is the most important sensory modality for marine mammals underwater, and exposure to anthropogenic sound can have deleterious effects. To appropriately assess the potential effects of exposure to sound, it is necessary to understand the frequency ranges marine mammals are able to hear. Current data indicate that not all marine mammal species have equal hearing capabilities (*e.g.*, Richardson *et al.*, 1995; Wartzok and Ketten, 1999; Au and Hastings, 2008). To reflect this, Southall *et al.* (2007) recommended that marine mammals be divided into functional hearing groups based on directly measured or estimated hearing ranges on the basis of available behavioral response data, audiograms derived using auditory evoked potential techniques, anatomical modeling, and other data. Note that no direct measurements of hearing ability have been successfully completed for mysticetes (*i.e.*, low-frequency cetaceans). Subsequently, NMFS (2018) described generalized hearing ranges for these marine mammal hearing groups. Generalized hearing ranges were chosen based on the approximately 65 decibel (dB) threshold from the normalized composite audiograms, with the exception for lower limits for low-frequency cetaceans where the lower bound was deemed to be biologically implausible and the lower bound from Southall *et al.* (2007) retained. Marine mammal hearing groups and their associated hearing ranges are provided in Table 2.

Table 2. Marine Mammal Hearing Groups (NMFS, 2018).

Hearing Group	Generalized Hearing Range*
Low-frequency (LF) cetaceans (baleen whales)	7 Hz to 35 kHz
Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 Hz to 160 kHz
High-frequency (HF) cetaceans (true porpoises, <i>Kogia</i> , river dolphins, cephalorhynchid, <i>Lagenorhynchus cruciger</i> & <i>L. australis</i>)	275 Hz to 160 kHz
Phocid pinnipeds (PW) (underwater) (true seals)	50 Hz to 86 kHz
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 39 kHz
* Represents the generalized hearing range for the entire group as a composite (<i>i.e.</i> , all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 dB threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall <i>et al.</i> 2007) and PW pinniped (approximation).	

For more detail concerning these groups and associated frequency ranges, please see NMFS (2018) for a review of available information. Twenty species of cetacean have the reasonable potential to co-occur with the planned survey activities. No pinnipeds are expected to be present or taken. Of the cetacean species that may be present, 18 are classified as mid-frequency cetaceans (*i.e.*, all delphinid and ziphiid species and the sperm whale) and two are classified as high-frequency cetaceans (*i.e.*, *Kogia* spp.). No low-frequency cetaceans (*i.e.*, baleen whales) are expected to be present or taken.

Potential Effects of Specified Activities on Marine Mammals and their Habitat

The effects of underwater noise from Scripps' geophysical survey activities have the potential to result in behavioral harassment of marine mammals in the vicinity of the survey area. The notice of proposed IHA (86 FR 71427; December 16, 2021) included a discussion of the effects of anthropogenic noise on marine mammals and the potential effects of underwater noise from Scripps' geophysical survey activities on marine mammals and their habitat. That information and analysis is incorporated by reference into this final IHA determination and is not repeated here; please refer to the notice of proposed IHA (86 FR 71427; December 16, 2021). The referenced information includes a summary and discussion of the ways that the specified activity may impact marine

mammals and their habitat. Consistent with the analysis in our prior **Federal Register** notices for similar Scripps surveys and after independently evaluating the analysis in Scripps' application, we determine that the survey is likely to result in the takes described in the Estimated Take section of this document and that other forms of take are not expected to occur.

The **Estimated Take** section later in this document includes a quantitative analysis of the number of individuals that are expected to be taken by this activity. The **Negligible Impact Analysis and Determination** section considers the content of this section, the **Estimated Take** section, and the **Mitigation** section, to draw conclusions regarding the likely impacts of these activities on the reproductive success or survivorship of individuals and how those impacts on individuals are likely to impact marine mammal species or stocks.

Estimated Take

This section provides an estimate of the number of incidental takes authorized through this IHA, which informs both NMFS' consideration of "small numbers" and the negligible impact determination.

Harassment is the only type of take expected to result from these activities. Except with respect to certain activities not pertinent here, section 3(18) of the MMPA defines "harassment" as any act of pursuit, torment, or annoyance, which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

Authorized takes are by Level B harassment only, as use of the acoustic sources (*i.e.*, seismic airgun) has the potential to result in disruption of behavioral patterns for individual marine mammals. Based on the nature of the activity and the anticipated

effectiveness of the mitigation measures (*i.e.*, marine mammal exclusion zones) discussed in detail below in **Mitigation** section, Level A harassment is neither anticipated nor authorized. As described previously, no mortality is anticipated or authorized for this activity. Below we describe how the take is estimated.

Generally speaking, we estimate take by considering: (1) acoustic thresholds above which NMFS believes the best available science indicates marine mammals will be behaviorally harassed or incur some degree of permanent hearing impairment; (2) the area or volume of water that will be ensonified above these levels in a day; (3) the density or occurrence of marine mammals within these ensonified areas; and, (4) the number of days of activities. We note that while these basic factors can contribute to a basic calculation to provide an initial prediction of takes, additional information that can qualitatively inform take estimates is also sometimes available (*e.g.*, previous monitoring results or average group size). Below, we describe the factors considered here in more detail and present the estimated and authorized take.

Acoustic Thresholds

NMFS recommends the use of acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to be behaviorally harassed (equated to Level B harassment) or to incur PTS of some degree (equated to Level A harassment).

Level B Harassment for non-explosive sources – Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source (*e.g.*, frequency, predictability, duty cycle), the environment (*e.g.*, bathymetry), and the receiving animals (hearing, motivation, experience, demography, behavioral context) and can be difficult to predict (Southall *et al.*, 2007, Ellison *et al.*, 2012). Based on what the available science indicates and the practical need to use a threshold based on a factor that is both

predictable and measurable for most activities, NMFS uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS predicts that marine mammals are likely to be behaviorally harassed in a manner we consider Level B harassment when exposed to underwater anthropogenic noise above received levels of 120 dB re 1 microPascal (μPa) root mean square (rms) for continuous (e.g., vibratory pile-driving, drilling) and above 160 dB re 1 μPa (rms) for non-explosive impulsive (e.g., seismic airguns) or intermittent (e.g., scientific sonar) sources.

Scripps' activity includes the use of impulsive seismic sources, and therefore the 160 dB re 1 μPa (rms) is applicable.

Level A harassment for non-explosive sources - NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) (Technical Guidance, 2018) identifies dual criteria to assess auditory injury (Level A harassment) to five different marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive). Scripps' activity includes the use of impulsive seismic sources.

These thresholds are provided in the table below. The references, analysis, and methodology used in the development of the thresholds are described in NMFS 2018 Technical Guidance, which may be accessed at

<https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance>.

Table 3. Thresholds identifying the onset of Permanent Threshold Shift (PTS)

	PTS Onset Acoustic Thresholds* (Received Level)	
Hearing Group	Impulsive	Non-impulsive
Low-Frequency (LF) Cetaceans	<i>Cell 1</i> $L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	<i>Cell 2</i> $L_{E,LF,24h}$: 199 dB
Mid-Frequency (MF) Cetaceans	<i>Cell 3</i> $L_{pk,flat}$: 230 dB	<i>Cell 4</i> $L_{E,MF,24h}$: 198 dB

	$L_{E, MF, 24h}$: 185 dB	
High-Frequency (HF) Cetaceans	<i>Cell 5</i> $L_{pk, flat}$: 202 dB $L_{E, HF, 24h}$: 155 dB	<i>Cell 6</i> $L_{E, HF, 24h}$: 173 dB
Phocid Pinnipeds (PW) (Underwater)	<i>Cell 7</i> $L_{pk, flat}$: 218 dB $L_{E, PW, 24h}$: 185 dB	<i>Cell 8</i> $L_{E, PW, 24h}$: 201 dB
Otariid Pinnipeds (OW) (Underwater)	<i>Cell 9</i> $L_{pk, flat}$: 232 dB $L_{E, OW, 24h}$: 203 dB	<i>Cell 10</i> $L_{E, OW, 24h}$: 219 dB
<p>* Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered.</p> <p><i>Note:</i> Peak sound pressure (L_{pk}) has a reference value of 1 μPa, and cumulative sound exposure level (L_E) has a reference value of 1 μPa²s. In this Table, thresholds are abbreviated to reflect American National Standards Institute standards (ANSI 2013). However, peak sound pressure is defined by ANSI as incorporating frequency weighting, which is not the intent for this Technical Guidance. Hence, the subscript “flat” is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (i.e., varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.</p>		

Ensonified Area

Here, we describe operational and environmental parameters of the activity that will feed into identifying the area ensonified above the acoustic thresholds, which include source levels and transmission loss coefficient.

The survey entails the use of a 2-airgun array with a total discharge of 90 in³ at a tow depth of 2-4 m. Lamont-Doherty Earth Observatory (L-DEO) model results are used to determine the 160 dB_{rms} radius for the 2-airgun array in deep water (> 1,000 m) down to a maximum water depth of 2,000 m. Received sound levels were predicted by L-DEO’s model (Diebold *et al.*, 2010) as a function of distance from the airguns, for the two 45 in³ airguns. This modeling approach uses ray tracing for the direct wave traveling from the array to the receiver and its associated source ghost (reflection at the air-water interface in the vicinity of the array), in a constant-velocity half-space (infinite homogenous ocean layer, unbounded by a seafloor). In addition, propagation

measurements of pulses from a 36-airgun array at a tow depth of 6 m have been reported in deep water (~1,600 m), intermediate water depth on the slope (~600-1,100 m), and shallow water (~50 m) in the Gulf of Mexico in 2007-2008 (Tolstoy *et al.*, 2009; Diebold *et al.*, 2010).

For deep and intermediate water cases, the field measurements cannot be used readily to derive the Level A and Level B harassment isopleths, as at those sites the calibration hydrophone was located at a roughly constant depth of 350-550 m, which may not intersect all the sound pressure level (SPL) isopleths at their widest point from the sea surface down to the maximum relevant water depth (~2,000 m) for marine mammals. At short ranges, where the direct arrivals dominate and the effects of seafloor interactions are minimal, the data at the deep sites are suitable for comparison with modeled levels at the depth of the calibration hydrophone. At longer ranges, the comparison with the model – constructed from the maximum SPL through the entire water column at varying distances from the airgun array – is the most relevant.

In deep and intermediate water depths, comparisons at short ranges between sound levels for direct arrivals recorded by the calibration hydrophone and model results for the same array tow depth are in good agreement (see Figures 12 and 14 in Appendix H of NSF-USGS 2011). Consequently, isopleths falling within this domain can be predicted reliably by the L-DEO model, although they may be imperfectly sampled by measurements recorded at a single depth. At greater distances, the calibration data show that seafloor-reflected and sub-seafloor-refracted arrivals dominate, whereas the direct arrivals become weak and/or incoherent. Aside from local topography effects, the region around the critical distance is where the observed levels rise closest to the model curve. However, the observed sound levels are found to fall almost entirely below the model curve. Thus, analysis of the Gulf of Mexico calibration measurements demonstrates that

although simple, the L-DEO model is a robust tool for conservatively estimating isopleths.

The planned surveys will acquire data with two 45-in³ guns at a tow depth of 2–4 m. For deep water (>1000 m), we use the deep-water radii obtained from L-DEO model results down to a maximum water depth of 2000 m for the airgun array with 2-m airgun separation. The radii for intermediate water depths (100–1000 m) are derived from the deep-water ones by applying a correction factor (multiplication) of 1.5, such that observed levels at very near offsets fall below the corrected mitigation curve (see Figure 16 in Appendix H of NSF-USGS 2011). No survey effort is planned to occur in shallow water (<100 m).

L-DEO’s modeling methodology is described in greater detail in SIO’s IHA application. The estimated distances to the Level B harassment isopleths for the planned airgun configuration in each water depth category are shown in Table 4.

Table 4. Predicted Radial Distances from R/V *Justo Sierra* Seismic Source to Isopleths Corresponding to Level B Harassment Threshold

Airgun configuration	Water depth (m)	Predicted Distances (m) to 160 dB rms SPL received sound level
Two 45 in ³ guns, 2-m separation, 4-m tow depth	> 1,000	539 ^a
	100 – 1,000	809 ^b

^a Distance based on L-DEO model results.

^b Distance based on L-DEO model results with a 1.5 x correction factor between deep and intermediate water depths.

Predicted distances to Level A harassment isopleths, which vary based on marine mammal hearing groups, were calculated based on modeling performed by L-DEO using the NUCLEUS software program and the NMFS User Spreadsheet. The updated acoustic thresholds for onset of hearing impacts from impulsive sounds (*e.g.*, airguns) contained in the Technical Guidance were presented as dual metric acoustic thresholds using both cumulative sound exposure level (SEL_{cum}) and peak sound pressure metrics (NMFS

2016a). As dual metrics, NMFS considers onset of PTS (Level A harassment) to have occurred when either one of the two metrics is exceeded (*i.e.*, metric resulting in the largest isopleth). The SEL_{cum} metric considers both level and duration of exposure, as well as auditory weighting functions by marine mammal hearing group. In recognition of the fact that the requirement to calculate Level A harassment ensonified areas could be more technically challenging to predict due to the duration component and the use of weighting functions in the new SEL_{cum} thresholds, NMFS developed an optional User Spreadsheet that includes tools to help predict a simple isopleth that can be used in conjunction with marine mammal density or occurrence to facilitate the estimation of take numbers.

The SEL_{cum} for the 2-GI airgun array is derived from calculating the modified far-field signature. The far-field signature is often used as a theoretical representation of the source level. To compute the far-field signature, the source level is estimated at a large distance below the array (*e.g.*, 9 km), and this level is back projected mathematically to a notional distance of 1 m from the array's geometrical center. However, it has been recognized that the source level from the theoretical far-field signature is never physically achieved at the source when the source is an array of multiple airguns separated in space (Tolstoy *et al.*, 2009). Near the source (at short ranges, distances <1 km), the pulses of sound pressure from each individual airgun in the source array do not stack constructively as they do for the theoretical far-field signature. The pulses from the different airguns spread out in time such that the source levels observed or modeled are the result of the summation of pulses from a few airguns, not the full array (Tolstoy *et al.*, 2009). At larger distances, away from the source array center, sound pressure of all the airguns in the array stack coherently, but not within one time sample, resulting in smaller source levels (a few dB) than the source level derived from the far-field signature. Because the far-field signature does not take into account the interactions of the two

airguns that occur near the source center and is calculated as a point source (single airgun), the modified far-field signature is a more appropriate measure of the sound source level for large arrays. For this smaller array, the modified far-field changes will be correspondingly smaller as well, but we use this method for consistency across all array sizes.

Scripps used the same acoustic modeling as for Level B harassment with a small grid step in both the inline and depth directions to estimate the SEL_{cum} and peak SPL. The propagation modeling takes into account all airgun interactions at short distances from the source including interactions between subarrays using the NUCLEUS software to estimate the notional signature and the MATLAB software to calculate the pressure signal at each mesh point of a grid. For a more complete explanation of this modeling approach, please see “Appendix A: Determination of Mitigation Zones” in Scripps’ IHA application.

In order to more realistically incorporate the Technical Guidance’s weighting functions over the seismic array’s full acoustic band, unweighted spectrum data for the airgun array (modeled in 1 Hertz (Hz) bands) was used to make adjustments (dB) to the unweighted spectrum levels, by frequency, according to the weighting functions for each relevant marine mammal hearing group. These adjusted/weighted spectrum levels were then converted to pressures (μPa) in order to integrate them over the entire broadband spectrum, resulting in broadband weighted source levels by hearing group that could be directly incorporated within the User Spreadsheet (*i.e.*, to override the Spreadsheet’s more simple weighting factor adjustment). Using the User Spreadsheet’s “safe distance” methodology for mobile sources (described by Sivle *et al.*, 2014) with the hearing group-specific weighted source levels, and inputs assuming spherical spreading propagation and source velocities and shot intervals provided in Scripps’ IHA application, potential radial distances to auditory injury zones were calculated for PTS thresholds. Calculated Level A

harassment zones for all cetacean hearing groups are presented in Table 5 below (no pinnipeds are expected to occur in the survey area).

Table 5. Modeled Radial Distances (m) to Isopleths Corresponding to Level A Harassment Thresholds.

Functional Hearing Group	Level A harassment zone (m)
Low-frequency cetaceans ¹	9.9
Mid-frequency cetaceans	1.0
High-frequency cetaceans	34.6

¹ Low-frequency cetaceans are not expected to be encountered or taken by Level A or Level B harassment during the survey.

Note that because of some of the assumptions included in the methods used, isopleths produced may be overestimates to some degree, which will ultimately result in some degree of overestimate of the potential for take by Level A harassment. However, these tools offer the best way to predict appropriate isopleths when more sophisticated 3D modeling methods are not available, and NMFS continues to develop ways to quantitatively refine these tools and will qualitatively address the output where appropriate. For mobile sources, such as the planned seismic survey, the User Spreadsheet predicts the closest distance at which a stationary animal would not incur PTS if the sound source traveled by the animal in a straight line at a constant speed.

Auditory injury is unlikely to occur for any functional hearing group given the very small modeled zones of injury (all estimated zones less than 35 meters (m)), and we therefore expect the potential for Level A harassment to be de minimis, even before the likely moderating effects of aversion and/or other compensatory behaviors (*e.g.*, Nachtigall *et al.*, 2018) are considered. Additionally, the method of estimating take as described below (see *Take Calculation and Estimation*) yielded only two species/guilds with calculated takes by Level A harassment, and the highest calculated take of those two groups was only two takes by Level A harassment (Table 9). We do

not believe that Level A harassment is a likely outcome for any hearing group and have not authorized take by Level A harassment for any species.

Marine Mammal Occurrence

In this section we provide the information about the presence, density, or group dynamics of marine mammals that will inform the take calculations.

For the planned survey area in the southeast Gulf of Mexico, Scripps determined that the best source of density data for marine mammal species that might be encountered in the project area was habitat-based density modeling conducted by Roberts *et al.* (2016). The Roberts *et al.* (2016) data provide abundance estimates for species or species guilds within 10 km x 10 km grid cells (100 square kilometer (km²)) within the U.S. EEZ in the Gulf of Mexico and Atlantic Ocean on a monthly or annual basis, depending on the species and location. In the Gulf of Mexico, marine mammals do not migrate seasonally, so a single estimate for each grid cell is provided and represents the predicted abundance of that species in that 100 km² location at any time of year.

As the planned survey lines are outside of the U.S. EEZ, they do not directly overlap the available spatial density data. However, some of the survey lines occur near the U.S. EEZ, and the distribution and abundance of species in U.S. EEZ waters are assumed representative of those in the nearby survey area. To select a representative sample of grid cells for the calculation of densities in three different water depth categories (>100 m, 100-1000 m, and >1000 m), a 200-km perimeter around the survey lines was created in GIS. The areas within this perimeter within the three depth categories was then used to select grid cells containing the estimates for each species in the Roberts *et al.* (2016) data (i.e., <100 m, $n = 157$ grid cells; 100–1000, $n = 169$ grid cells; >1000 m, $n = 410$ grid cells). The average abundance for each species in each water depth category was calculated as the mean value of the grid cells within each category and then

converted to density (individuals/1 km²) by dividing by 100 km². Estimated densities for marine mammal species that could occur in the project area are shown in Table 6.

Table 6. Marine Mammal Densities in the Survey Area

Species	Estimated Density (#/km ²)	
	Intermediate Water 100-1000 m	Deep Water >1000 m
Sperm whale	0.00384	0.00579
Atlantic spotted dolphin	0.07022	0.00001
Beaked whale guild ^a	0.00498	0.00882
Common bottlenose dolphin	0.18043	0.00566
Clymene dolphin	0.00325	0.00403
False killer whale	0.00744	0.00748
Frasers dolphin	0.00386	0.00389
Killer whale	0.00007	0.00082
Melon-headed whale	0.00624	0.01186
Pantropical spotted dolphin	0.14764	0.31353
Short-finned pilot whales	0.00636	0.00128
Pygmy killer whale	0.00201	0.00648
Risso's dolphin	0.02315	0.00748
Rough-toothed dolphin	0.00890	0.00768
Spinner dolphin	0.15723	0.00412
Striped dolphin	0.00212	0.01268
<i>Kogia</i> spp. ^b	0.01052	0.00490

^a Includes Cuvier's beaked whale, Blainville's beaked whale, and Gervais' beaked whale

^b Pygmy sperm whales and dwarf sperm whales

Take Calculation and Estimation

Here we describe how the information provided above is brought together to produce a quantitative take estimate.

The area expected to be ensonified was determined by entering the planned survey lines into ArcGIS and then using GIS to identify the relevant ensonified areas by “drawing” the 160-dB threshold buffer around each seismic line according to the depth category in which the lines occurred. The total ensonified area within each depth category was then divided by the total number of survey days to provide the proportional daily ensonified area within each depth category. The total ensonified area in each depth class was multiplied by 1.25 to add an additional 25 percent contingency to allow for

additional airgun operations such as testing of the source or re-surveying lines with poor data quality. Due to uncertainties with respect to permitting for surveys in Cuban waters, ensonified areas were calculated separately for transect lines in Mexican and Cuban EEZs, for which 4.2 and 5.5 survey days were estimated, respectively (Table 7). If Scripps is unable to operate within the Cuban EEZ, they will conduct the entire survey within the Mexican EEZ, with the same estimated daily proportions of survey activity in each depth strata occurring over a total of 9.7 survey days. This scenario yields a total ensonified area of 3,595.6 km², with 1,848.6 km² in intermediate waters (100-1,000 m) and 1,747.0 km² in deep waters (>1,000 m).

Table 7. Areas (km²) in Mexican and Cuban EEZs to be Ensonified Above Level B Harassment Threshold

Water depth category	Relevant isopleth (m)	Ensonified area in Mexican EEZ (km ²)	Ensonified area in Cuban EEZ (km ²)	Total ensonified area (km ²)	Total area with 25% increase (km ²)
Intermediate (100-1000 m)	809	640.35	0	640.35	800.44
Deep (> 1000)	539	605.14	1298.09	1903.23	2379.04
Total		1245.49	1298.09	2543.58	3179.48

To estimate the total number of possible exposures, the total ensonified area within each depth category is multiplied by the densities in each depth category. Scripps does not expect to know whether surveying within Cuban waters will be permitted until immediately before the research cruise, therefore NMFS has authorized the highest calculated take number for each species across the two survey scenarios (Table 8).

Table 8. Calculated and Authorized Takes by Level B Harassment, and Percentage of Population Exposed

Species	Mexico and Cuba lines Calculated Level B	Mexico and Cuba Lines Calculated Level A	Mexico Only Calculated Level B	Mexico Only Calculated Level A	Authorized Level B	Authorized Level A	Population Size ^a	Percent of Population
Sperm whale	17	0	17	0	17	0	2,207	0.78
Atlantic spotted dolphin	56	0	130	0	130	0	74,785	0.17
Beaked whale guild ^c	25	0	25	0	25	0	3,768	0.66
Common bottlenose dolphin	158	0	343	0	343	0	176,108	0.20
Clymene dolphin	90 ^b	0	90 ^b	0	90 ^b	0	11,895	0.76
False killer whale	28 ^b	0	28 ^b	0	28 ^b	0	3,204	0.87
Frasers dolphin	65 ^b	0	65 ^b	0	65 ^b	0	1,665	3.90
Killer whale	7 ^b	0	7 ^b	0	7 ^b	0	267	2.62
Melon-headed whale	100 ^b	0	100 ^b	0	100 ^b	0	7,003	1.43
Pantropical spotted dolphin	862	2	820	1	864	0	102,361	0.84
Pygmy killer whale	19 ^b	0	19 ^b	0	19 ^b	0	2,126	0.89
Risso's dolphin	36	0	56	0	56	0	3,764	1.48
Rough-toothed dolphin	56 ^b	0	56 ^b	0	56 ^b	0	4,853	1.15
Short-finned pilot whales	25 ^b	0	25 ^b	0	25 ^b	0	1,981	1.26
Spinner dolphin	136	0	298	0	298	0	25,114	1.19
Striped dolphin	46 ^b	0	46 ^b	0	46 ^b	0	5,229	0.88
<i>Kogia</i> spp.	19	1	27	1	28	0	4,373	0.64

^a Best abundance estimate. For most taxa, the best abundance estimate for purposes of comparison with take estimates is considered here to be the model-predicted abundance (Roberts et al., 2016). For those taxa where a density surface model predicting abundance by month was produced, the maximum mean seasonal abundance was used. For those taxa where abundance is not predicted by month, only mean annual abundance is available. For the killer whale, the larger estimated SAR abundance estimate is used. ^b Calculated and authorized take increased to mean group size as presented by Maze-Foley and Mullin (2006).

^c Cuvier's, Blainville's, and Gervais' beaked whales.

Mitigation

In order to issue an IHA under section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to the activity, and other means of effecting the least practicable impact on the species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stock for taking for certain subsistence uses (latter not applicable for this action). NMFS regulations require applicants for incidental take authorizations to include information about the availability and feasibility (economic and

technological) of equipment, methods, and manner of conducting the activity or other means of effecting the least practicable adverse impact upon the affected species or stocks and their habitat (50 CFR 216.104(a)(11)).

In evaluating how mitigation may or may not be appropriate to ensure the least practicable adverse impact on species or stocks and their habitat, as well as subsistence uses where applicable, we carefully consider two primary factors:

(1) The manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or stocks, and their habitat. This considers the nature of the potential adverse impact being mitigated (likelihood, scope, range). It further considers the likelihood that the measure will be effective if implemented (probability of accomplishing the mitigating result if implemented as planned), the likelihood of effective implementation (probability implemented as planned); and

(2) The practicability of the measures for applicant implementation, which may consider such things as cost, impact on operations, and, in the case of a military readiness activity, personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

Scripps indicated that it reviewed mitigation measures employed during seismic research surveys authorized by NMFS under previous incidental harassment authorizations, as well as recommended best practices in Richardson *et al.* (1995), Pierson *et al.* (1998), Weir and Dolman (2007), Nowacek *et al.* (2013), Wright (2014), and Wright and Cosentino (2015), and has incorporated a suite of mitigation measures into their project description based on the above sources.

To reduce the potential for disturbance from acoustic stimuli associated with the activities, Scripps will implement mitigation measures for marine mammals. Mitigation measures that must be adopted during the planned surveys include: (1) Vessel-based

visual mitigation monitoring; (2) Establishment of a marine mammal exclusion zone (EZ) and buffer zone; (3) shutdown procedures; (4) ramp-up procedures; and (4) vessel strike avoidance measures.

Vessel-Based Visual Mitigation Monitoring

Visual monitoring requires the use of trained observers (herein referred to as visual Protected Species Observers (PSOs)) to scan the ocean surface visually for the presence of marine mammals. PSO observations must take place during all daytime airgun operations and nighttime start ups (if applicable) of the airguns. If airguns are operating throughout the night, observations must begin 30 minutes prior to sunrise. If airguns are operating after sunset, observations must continue until 30 minutes following sunset. Following a shutdown for any reason, observations must occur for at least 30 minutes prior to the planned start of airgun operations. Observations must also occur for 30 minutes after airgun operations cease for any reason. Observations must also be made during daytime periods when the R/V *Justo Sierra* is underway without seismic operations, such as during transits, to allow for comparison of sighting rates and behavior with and without airgun operations and between acquisition periods. Airgun operations must be suspended when marine mammals are observed within, or about to enter, the designated exclusion zone (EZ) (as described below).

During seismic operations, two visual PSOs must be on duty and conduct visual observations at all times during daylight hours (*i.e.*, from 30 minutes prior to sunrise through 30 minutes following sunset). PSO(s) must be on duty in shifts of duration no longer than 4 hours. Other vessel crew must also be instructed to assist in detecting marine mammals and in implementing mitigation requirements (if practical). Before the start of the seismic survey, the crew must be given additional instruction in detecting marine mammals and implementing mitigation requirements.

The R/V *Justo Sierra* is a suitable platform from which PSOs would watch for marine mammals. Standard equipment for marine mammal observers must be 7 x 50 reticule binoculars and optical range finders. At night, night-vision equipment must be available. The observers must be in communication with ship's officers on the bridge and scientists in the vessel's operations laboratory, so they can advise promptly of the need for vessel strike avoidance measures (see *Vessel Strike Avoidance Measures* below) or seismic source shutdown.

The PSOs must have no tasks other than to conduct observational effort, record observational data, and communicate with and instruct relevant vessel crew with regard to the presence of marine mammals and mitigation requirements. PSO resumes must be provided to NMFS for approval. At least one PSO must have a minimum of 90 days prior at-sea experience working as a PSO during a seismic survey. One "experienced" visual PSO will be designated as the lead for the entire protected species observation team. The lead will serve as primary point of contact for the vessel operator.

Exclusion Zone (EZ) and Buffer Zone

An EZ is a defined area within which occurrence of a marine mammal triggers mitigation action intended to reduce the potential for certain outcomes, *e.g.*, auditory injury, disruption of critical behaviors. The PSOs must establish a minimum EZ with a 100 m radius for the airgun array. The 100-m EZ must be based on radial distance from any element of the airgun array (rather than being based around the vessel itself). With certain exceptions (described below), if a marine mammal appears within, enters, or appears on a course to enter this zone, the acoustic source must be shut down (see *Shutdown Procedures* below).

The 100-m radial distance of the standard EZ is precautionary in the sense that it would be expected to contain sound exceeding injury criteria for all marine mammal hearing groups (Table 5) while also providing a consistent, reasonably observable zone

within which PSOs would typically be able to conduct effective observational effort. In the 2011 Programmatic Environmental Impact Statement for marine scientific research funded by the National Science Foundation or the U.S. Geological Survey (NSF-USGS 2011), Alternative B (the Preferred Alternative) conservatively applied a 100-m EZ for all low-energy acoustic sources in water depths >100 m, with low-energy acoustic sources defined as any towed acoustic source with a single or a pair of clustered airguns with individual volumes of $\leq 250 \text{ in}^3$. Thus the 100-m EZ required for this survey is consistent with the PEIS.

Our intent in prescribing a standard EZ distance is to (1) encompass zones within which auditory injury could occur on the basis of instantaneous exposure; (2) provide additional protection from the potential for more severe behavioral reactions (*e.g.*, panic, antipredator response) for marine mammals at relatively close range to the acoustic source; (3) provide consistency for PSOs, who need to monitor and implement the EZ; and (4) define a distance within which detection probabilities are reasonably high for most species under typical conditions.

PSOs must also establish and monitor a 100-m buffer zone beyond the EZ (for a total of 200 m). During use of the acoustic source, occurrence of marine mammals within the buffer zone (but outside the EZ) must be communicated to the operator to prepare for potential shutdown of the acoustic source. The buffer zone is discussed further under *Ramp-Up Procedures* below.

An extended EZ of 500 m must be established for all beaked whales and *Kogia* species as well as for aggregations of six or more large whales (*i.e.*, sperm whale) or a large whale with a calf (calf defined as an animal less than two-thirds the body size of an adult observed to be in close association with an adult).

Ramp-up Procedures

Ramp-up of an acoustic source is intended to provide a gradual increase in sound levels following a shutdown, enabling animals to move away from the source if the signal is sufficiently aversive prior to its reaching full intensity. Ramp-up is required after the array is shut down for any reason for longer than 15 minutes. Ramp-up must begin with the activation of one 45 in³ airgun, with the second 45 in³ airgun activated after 5 minutes.

Two PSOs are required to monitor during ramp-up. During ramp up, the PSOs must monitor the EZ, and if marine mammals were observed within the EZ or buffer zone, a shutdown must be implemented as though the full array were operational. If airguns have been shut down due to PSO detection of a marine mammal within or approaching the EZ, ramp-up must not be initiated until all marine mammals have cleared the EZ, during the day or night. Criteria for clearing the EZ would be as described above.

Thirty minutes of pre-start clearance observation are required prior to ramp-up for any shutdown of longer than 30 minutes (*i.e.*, when the array is shut down during transit from one line to another). This 30-minute pre-start clearance period may occur during any vessel activity (*i.e.*, transit). If a marine mammal is observed within or approaching the 200-m buffer or 500-m extended EZ during this pre-start clearance period, ramp-up must not be initiated until all marine mammals cleared the relevant area. Criteria for clearing the EZ would be as described above. If the airgun array has been shut down for reasons other than mitigation (*e.g.*, mechanical difficulty) for a period of less than 30 minutes, it may be activated again without ramp-up if PSOs have maintained constant visual observation and no detections of any marine mammal have occurred within the EZ or buffer zone. Ramp-up must be planned to occur during periods of good visibility when possible. However, ramp-up is allowed at night and during poor visibility if the 100 m EZ and 200 m buffer zone have been monitored by visual PSOs for 30 minutes prior to ramp-up.

The operator is required to notify a designated PSO of the planned start of ramp-up as agreed-upon with the lead PSO; the notification time must not be less than 60 minutes prior to the planned ramp-up. A designated PSO must be notified again immediately prior to initiating ramp-up procedures and the operator must receive confirmation from the PSO to proceed. The operator must provide information to PSOs documenting that appropriate procedures were followed. Following deactivation of the array for reasons other than mitigation, the operator is required to communicate the near-term operational plan to the lead PSO with justification for any planned nighttime ramp-up.

Shutdown Procedures

If a marine mammal is detected outside the EZ but is likely to enter the EZ, the airguns must be shut down before the animal is within the EZ. Likewise, if a marine mammal is already within the EZ when first detected, the airguns must be shut down immediately.

Following a shutdown, airgun activity must not resume until the marine mammal has cleared the EZ. The animal is considered to have cleared the EZ if the following conditions have been met:

- it is visually observed to have departed the EZ;
- it has not been seen within the EZ for 15 min in the case of small odontocetes; or
- it has not been seen within the EZ for 30 min in the case of large odontocetes, including sperm and beaked whales.

This shutdown requirement is in place for all marine mammals, with the exception of small delphinids under certain circumstances. As defined here, the small delphinid group is intended to encompass those members of the Family Delphinidae most likely to voluntarily approach the source vessel for purposes of interacting with the vessel and/or airgun array (*e.g.*, bow riding). This exception to the shutdown requirement would

apply solely to specific genera of small dolphins –*Lagenodelphis*, *Stenella*, *Steno*, and *Tursiops*.

We include this small delphinid exception because shutdown requirements for small delphinids under all circumstances represent practicability concerns without likely commensurate benefits for the animals in question. Small delphinids are generally the most commonly observed marine mammals in the specific geographic region and would typically be the only marine mammals likely to intentionally approach the vessel. As described above, auditory injury is extremely unlikely to occur for mid-frequency cetaceans (*e.g.*, delphinids), as this group is relatively insensitive to sound produced at the predominant frequencies in an airgun pulse while also having a relatively high threshold for the onset of auditory injury (*i.e.*, permanent threshold shift).

A large body of anecdotal evidence indicates that small delphinids commonly approach vessels and/or towed arrays during active sound production for purposes of bow riding, with no apparent effect observed in those delphinids (*e.g.*, Barkaszi *et al.*, 2012, 2018). The potential for increased shutdowns resulting from such a measure would require the R/V *Justo Sierra* to revisit the missed track line to reacquire data, resulting in an overall increase in the total sound energy input to the marine environment and an increase in the total duration over which the survey is active in a given area. Although other mid-frequency hearing specialists (*e.g.*, large delphinids) are no more likely to incur auditory injury than are small delphinids, they are much less likely to approach vessels. Therefore, retaining a shutdown requirement for large delphinids would not have similar impacts in terms of either practicability for the applicant or corollary increase in sound energy output and time on the water. We do anticipate some benefit for a shutdown requirement for large delphinids in that it simplifies somewhat the total range of decision-making for PSOs and may preclude any potential for physiological effects other than to

the auditory system as well as some more severe behavioral reactions for any such animals in close proximity to the source vessel.

Visual PSOs must use best professional judgment in making the decision to call for a shutdown if there is uncertainty regarding identification (*i.e.*, whether the observed marine mammal(s) belongs to one of the delphinid genera for which shutdown is waived or one of the species with a larger EZ).

Shutdown of the acoustic source is also required upon observation of a species for which authorization has not been granted (*e.g.*, baleen whales), or a species for which authorization has been granted but the authorized number of takes are met, observed approaching or within the Level B harassment zones.

Vessel Strike Avoidance Measures

Vessel strike avoidance measures are intended to minimize the potential for collisions with marine mammals. These requirements do not apply in any case where compliance would create an imminent and serious threat to a person or vessel or to the extent that a vessel is restricted in its ability to maneuver and, because of the restriction, cannot comply.

The required measures include the following: Vessel operator and crew must maintain a vigilant watch for all marine mammals and slow down or stop the vessel or alter course to avoid striking any marine mammal. A visual observer aboard the vessel must monitor a vessel strike avoidance zone around the vessel according to the parameters stated below. Visual observers monitoring the vessel strike avoidance zone may be either third-party observers or crew members, but crew members responsible for these duties must be provided sufficient training to distinguish marine mammals from other phenomena. Vessel strike avoidance measures must be followed during surveys and while in transit.

The vessel must maintain a minimum separation distance of 100 m from large whales (*i.e.*, baleen whales and sperm whales). If a large whale is within 100 m of the vessel, the vessel must reduce speed and shift the engine to neutral, and must not engage the engines until the whale has moved outside of the vessel's path and the minimum separation distance has been established. If the vessel is stationary, the vessel must not engage engines until the whale(s) has moved out of the vessel's path and beyond 100 m. The vessel must maintain a minimum separation distance of 50 m from all other marine mammals, to the extent practicable. If an animal is encountered during transit, the vessel must attempt to remain parallel to the animal's course, avoiding excessive speed or abrupt changes in course. Vessel speeds must be reduced to 10 knots or less when mother/calf pairs, pods, or large assemblages of cetaceans are observed near the vessel.

We have carefully evaluated the suite of mitigation measures described here and considered a range of other measures in the context of ensuring that we prescribe the means of effecting the least practicable adverse impact on the affected marine mammal species and stocks and their habitat. Based on our evaluation of the required measures, NMFS has determined that the mitigation measures provide the means effecting the least practicable impact on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Monitoring and Reporting

In order to issue an IHA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth requirements pertaining to the monitoring and reporting of such taking. The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the planned survey area. Effective reporting is critical both to

compliance as well as ensuring that the most value is obtained from the required monitoring.

Monitoring and reporting requirements prescribed by NMFS should contribute to improved understanding of one or more of the following:

- Occurrence of marine mammal species or stocks in the area in which take is anticipated (*e.g.*, presence, abundance, distribution, density).
- Nature, scope, or context of likely marine mammal exposure to potential stressors/impacts (individual or cumulative, acute or chronic), through better understanding of: (1) action or environment (*e.g.*, source characterization, propagation, ambient noise); (2) affected species (*e.g.*, life history, dive patterns); (3) co-occurrence of marine mammal species with the action; or (4) biological or behavioral context of exposure (*e.g.*, age, calving or feeding areas).
- Individual marine mammal responses (behavioral or physiological) to acoustic stressors (acute, chronic, or cumulative), other stressors, or cumulative impacts from multiple stressors.
- How anticipated responses to stressors impact either: (1) long-term fitness and survival of individual marine mammals; or (2) populations, species, or stocks.
- Effects on marine mammal habitat (*e.g.*, marine mammal prey species, acoustic habitat, or other important physical components of marine mammal habitat).
- Mitigation and monitoring effectiveness.

Monitoring that is designed specifically to facilitate mitigation measures, such as monitoring of the EZ to inform potential shutdowns of the airgun array, are described above and are not repeated here. The required monitoring and reporting includes the following:

Vessel-Based Visual Monitoring

As described above, PSO observations must take place during daytime airgun operations and nighttime start-ups (if applicable) of the airguns. During seismic operations, visual PSOs must be based aboard the R/V *Justo Sierra*. PSOs must be appointed by Scripps with NMFS approval. The PSOs must have successfully completed relevant training, including completion of all required coursework and passing a written and/or oral examination developed for the training program, and must have successfully attained a bachelor's degree from an accredited college or university with a major in one of the natural sciences and a minimum of 30 semester hours or equivalent in the biological sciences and at least one undergraduate course in math or statistics. The educational requirements may be waived if the PSO has acquired the relevant skills through alternate training, including (1) secondary education and/or experience comparable to PSO duties; (2) previous work experience conducting academic, commercial, or government-sponsored marine mammal surveys; or (3) previous work experience as a PSO; the PSO must demonstrate good standing and consistently good performance of PSO duties.

During seismic operations in daylight hours (30 minutes before sunrise through 30 minutes after sunset), two PSOs must monitor for marine mammals around the seismic vessel. PSOs must be on duty in shifts of duration no longer than 4 hours. Other crew must also be instructed to assist in detecting marine mammals and in implementing mitigation requirements (if practical). During daytime, PSOs must scan the area around the vessel systematically with reticle binoculars (e.g., 7×50 Fujinon) and with the naked eye. At night, PSOs must be equipped with night-vision equipment.

For data collection purposes, PSOs must use standardized data collection forms, whether hard copy or electronic. PSOs must record detailed information about any implementation of mitigation requirements, including the distance of animals to the acoustic source and description of specific actions that ensued, the behavior of the

animal(s), any observed changes in behavior before and after implementation of mitigation, and if shutdown was implemented, the length of time before any subsequent ramp-up of the acoustic source. If required mitigation was not implemented, PSOs must record a description of the circumstances. At a minimum, the following information must be recorded:

- Vessel names (source vessel and other vessels associated with survey) and call signs;

- PSO names and affiliations;

- Dates of departures and returns to port with port name;

- Date and participants of PSO briefings;

- Dates and times (Greenwich Mean Time) of survey effort and times

corresponding with PSO effort;

- Vessel location (latitude/longitude) when survey effort began and ended and vessel location at beginning and end of visual PSO duty shifts;

- Vessel heading and speed at beginning and end of visual PSO duty shifts and upon any line change;

- Environmental conditions while on visual survey (at beginning and end of PSO shift and whenever conditions changed significantly), including BSS and any other relevant weather conditions including cloud cover, fog, sun glare, and overall visibility to the horizon;

- Factors that may have contributed to impaired observations during each PSO shift change or as needed as environmental conditions changed (*e.g.*, vessel traffic, equipment malfunctions); and

- Survey activity information, such as acoustic source power output while in operation, number and volume of airguns operating in the array, tow depth of the array,

and any other notes of significance (*i.e.*, pre-clearance, ramp-up, shutdown, testing, shooting, ramp-up completion, end of operations, streamers, etc.).

The following information must be recorded upon visual observation of any protected species:

- Watch status (sighting made by PSO on/off effort, opportunistic, crew, alternate vessel/platform);
- PSO who sighted the animal;
- Time of sighting;
- Vessel location at time of sighting;
- Water depth;
- Direction of vessel's travel (compass direction);
- Direction of animal's travel relative to the vessel;
- Pace of the animal;
- Estimated distance to the animal and its heading relative to vessel at initial sighting;
- Identification of the animal (*e.g.*, genus/species, lowest possible taxonomic level, or unidentified) and the composition of the group if there is a mix of species;
- Estimated number of animals (high/low/best);
- Estimated number of animals by cohort (adults, yearlings, juveniles, calves, group composition, etc.);
- Description (as many distinguishing features as possible of each individual seen, including length, shape, color, pattern, scars or markings, shape and size of dorsal fin, shape of head, and blow characteristics);

- Detailed behavior observations (*e.g.*, number of blows/breaths, number of surfaces, breaching, spyhopping, diving, feeding, traveling; as explicit and detailed as possible; note any observed changes in behavior);
- Animal's closest point of approach (CPA) and/or closest distance from any element of the acoustic source;
- Platform activity at time of sighting (*e.g.*, deploying, recovering, testing, shooting, data acquisition, other); and
- Description of any actions implemented in response to the sighting (*e.g.*, delays, shutdown, ramp-up) and time and location of the action.

Reporting

A report must be submitted to NMFS within 90 days after the end of the cruise. The report must describe the operations that were conducted and sightings of marine mammals near the operations. The report must provide full documentation of methods, results, and interpretation pertaining to all monitoring. The 90-day report must summarize the dates and locations of seismic operations, and all marine mammal sightings (dates, times, locations, activities, associated seismic survey activities).

The draft report must also include geo-referenced time-stamped vessel tracklines for all time periods during which airguns were operating. Tracklines must include points recording any change in airgun status (*e.g.*, when the airguns began operating, when they were turned off, or when they changed from full array to single gun or vice versa). GIS files must be provided in ESRI shapefile format and include the UTC date and time, latitude in decimal degrees, and longitude in decimal degrees. All coordinates must be referenced to the WGS84 geographic coordinate system. In addition to the report, all raw observational data must be made available to NMFS. The report must summarize the data collected as described above and in the IHA. A final report must be submitted within 30 days following resolution of any comments on the draft report.

Reporting Injured or Dead Marine Mammals

Discovery of injured or dead marine mammals – In the event that personnel involved in survey activities covered by the authorization discover an injured or dead marine mammal, Scripps must report the incident to the Office of Protected Resources (OPR), NMFS and to the NMFS Southeast Regional Stranding Coordinator as soon as feasible. The report must include the following information:

- Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);
- Species identification (if known) or description of the animal(s) involved;
- Condition of the animal(s) (including carcass condition if the animal is dead);
- Observed behaviors of the animal(s), if alive;
- If available, photographs or video footage of the animal(s); and
- General circumstances under which the animal was discovered.

Vessel strike – In the event of a ship strike of a marine mammal by any vessel involved in the activities covered by the authorization, Scripps must report the incident to OPR, NMFS and to the NMFS Southeast Regional Stranding Coordinator as soon as feasible. The report must include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Vessel's speed during and leading up to the incident;
- Vessel's course/heading and what operations were being conducted (if applicable);
- Status of all sound sources in use;
- Description of avoidance measures/requirements that were in place at the time of the strike and what additional measure were taken, if any, to avoid strike;
- Environmental conditions (*e.g.*, wind speed and direction, Beaufort sea state, cloud cover, visibility) immediately preceding the strike;

- Species identification (if known) or description of the animal(s) involved;
- Estimated size and length of the animal that was struck;
- Description of the behavior of the animal immediately preceding and following the strike;
- If available, description of the presence and behavior of any other marine mammals present immediately preceding the strike;
- Estimated fate of the animal (*e.g.*, dead, injured but alive, injured and moving, blood or tissue observed in the water, status unknown, disappeared); and
- To the extent practicable, photographs or video footage of the animal(s).

Negligible Impact Analysis and Determination

NMFS has defined negligible impact as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.*, population-level effects). An estimate of the number of takes alone is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be “taken” through harassment, NMFS considers other factors, such as the likely nature of any responses (*e.g.*, intensity, duration), the context of any responses (*e.g.*, critical reproductive time or location, migration), as well as effects on habitat, and the likely effectiveness of the mitigation. We also assess the number, intensity, and context of estimated takes by evaluating this information relative to population status. Consistent with the 1989 preamble for NMFS’s implementing regulations (54 FR 40338; September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into this analysis via their impacts on the environmental baseline (*e.g.*,

as reflected in the regulatory status of the species, population size and growth rate where known, ongoing sources of human-caused mortality, or ambient noise levels).

To avoid repetition, our analysis applies to all species listed in Table 1, given that NMFS expects the anticipated effects of the planned geophysical survey to be similar in nature. Where there are meaningful differences between species or stocks, or groups of species, in anticipated individual responses to activities, impact of expected take on the population due to differences in population status, or impacts on habitat, NMFS has identified species-specific factors to inform the analysis.

NMFS does not anticipate that injury, serious injury or mortality would occur as a result of Scripps' planned survey, even in the absence of mitigation, and none is authorized. Similarly, non-auditory physical effects, stranding, and vessel strike are not expected to occur. Although a few incidents of Level A harassment were predicted through the quantitative exposure estimation process (see **Estimated Take**), NMFS has determined that this is not a realistic result due to the small estimated Level A harassment zones for the species (no greater than approximately 50 m) and the mitigation requirements, and no take by Level A harassment has been authorized. These estimated zones are larger than what would realistically occur, as discussed in the Estimated Take section.

We expect that takes would be in the form of short-term Level B behavioral harassment in the form of temporary avoidance of the area or decreased foraging (if such activity were occurring), reactions that are considered to be of low severity and with no lasting biological consequences (*e.g.*, Southall *et al.*, 2007, Ellison *et al.*, 2012).

Marine mammal habitat may be impacted by elevated sound levels, but these impacts would be temporary. Prey species are mobile and are broadly distributed throughout the project area; therefore, marine mammals that may be temporarily displaced during survey activities are expected to be able to resume foraging once they

have moved away from areas with disturbing levels of underwater noise. Because of the relatively short duration (up to 12 days) and temporary nature of the disturbance, the availability of similar habitat and resources in the surrounding area, the impacts to marine mammals and the food sources that they utilize are not expected to cause significant or long-term consequences for individual marine mammals or their populations. No biologically important areas, designated critical habitat, or other habitat of known significance would be impacted by the planned activities.

Negligible Impact Conclusions

The planned survey would be of short duration (up to 12 days of seismic operations), and the acoustic “footprint” of the survey would be small relative to the ranges of the marine mammals that would potentially be affected. Sound levels would increase in the marine environment in a relatively small area surrounding the vessel compared to the range of the marine mammals within the survey area. Short-term exposures to survey operations are expected to only temporarily affect marine mammal behavior in the form of avoidance, and the potential for longer-term avoidance of important areas is limited. Short-term exposures to survey operations are not likely to impact marine mammal behavior, and the potential for longer-term avoidance of important areas is limited.

The required mitigation measures are expected to reduce the number and/or severity of takes by allowing for detection of marine mammals in the vicinity of the vessel by visual observers, and by minimizing the severity of any potential exposures via shutdowns of the airgun array.

NMFS concludes that exposures to marine mammal species and stocks due to Scripps’ planned survey would result in only short-term (temporary and short in duration) effects to individuals exposed, over relatively small areas of the affected animals’ ranges. Animals may temporarily avoid the immediate area, but are not expected to permanently

abandon the area. Major shifts in habitat use, distribution, or foraging success are not expected. NMFS does not anticipate the authorized take to impact annual rates of recruitment or survival.

In summary and as described above, the following factors primarily support our determination that the impacts resulting from this activity are not expected to adversely affect the species or stock through effects on annual rates of recruitment or survival:

- No Level A harassment, serious injury or mortality is anticipated or authorized;
- The planned activity is temporary and of relatively short duration (up to 12 days);
- The anticipated impacts of the planned activity on marine mammals would primarily be temporary behavioral changes in the form of avoidance of the area around the survey vessel;
- The availability of alternate areas of similar habitat value for marine mammals to temporarily vacate the survey area during the planned survey to avoid exposure to sounds from the activity;
- The potential adverse effects on fish or invertebrate species that serve as prey species for marine mammals from the planned survey would be temporary and spatially limited, and impacts to marine mammal foraging would be minimal; and
- The required mitigation measures, including visual monitoring, shutdowns, ramp-up, and prescribed measures based on energy size are expected to minimize potential impacts to marine mammals (both amount and severity).

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the required monitoring and mitigation measures, NMFS finds that the

total marine mammal take from Scripps' activity will have a negligible impact on all affected marine mammal species or stocks.

Small Numbers

As noted above, only small numbers of incidental take may be authorized under sections 101(a)(5)(A) and (D) of the MMPA for specified activities other than military readiness activities. The MMPA does not define small numbers and so, in practice, where estimated numbers are available, NMFS compares the number of individuals taken to the most appropriate estimation of abundance of the relevant species or stock in our determination of whether an authorization is limited to small numbers of marine mammals. When the predicted number of individuals to be taken is fewer than one third of the species or stock abundance, the take is considered to be of small numbers. Additionally, other qualitative factors may be considered in the analysis, such as the temporal or spatial scale of the activities.

The amount of take NMFS has authorized is below one third of the estimated population abundance of all species (Roberts *et al.*, 2016). In fact, take of individuals is less than 4 percent of the abundance of the affected populations (see Table 8).

Based on the analysis contained herein of the planned activity (including the required mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS finds that small numbers of marine mammals will be taken relative to the population size of the affected species or stocks.

Unmitigable Adverse Impact Analysis and Determination

There are no relevant subsistence uses of the affected marine mammal stocks or species implicated by this action. Therefore, NMFS has determined that the total taking of affected species or stocks would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence purposes.

National Environmental Policy Act

To comply with the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq.*) and NOAA Administrative Order (NAO) 216-6A, NMFS must review our proposed action (*i.e.*, the issuance of an incidental harassment authorization) with respect to potential impacts on the human environment.

This action is consistent with categories of activities identified in Categorical Exclusion B4 (incidental harassment authorizations with no anticipated serious injury or mortality) of the Companion Manual for NOAA Administrative Order 216-6A, which do not individually or cumulatively have the potential for significant impacts on the quality of the human environment and for which we have not identified any extraordinary circumstances that would preclude this categorical exclusion. Accordingly, NMFS has determined that the issuance of the IHA qualifies to be categorically excluded from further NEPA review.

Endangered Species Act

Section 7(a)(2) of the Endangered Species Act of 1973 (ESA: 16 U.S.C. 1531 *et seq.*) requires that each Federal agency insure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat. To ensure ESA compliance for the issuance of IHAs, NMFS consults internally whenever we propose to authorize take for endangered or threatened species, in this case with the ESA Interagency Cooperation Division.

The NMFS Office of Protected Resources Interagency Cooperation Division issued a Biological Opinion under section 7 of the ESA, on the issuance of an IHA to Scripps under section 101(a)(5)(D) of the MMPA by the NMFS Office of Protected Resources Permits and Conservation Division. The Biological Opinion concluded that the proposed action is not likely to jeopardize the continued existence of any listed marine mammal species.

Authorization

As a result of these determinations, NMFS has issued an IHA to Scripps for conducting geophysical surveys in the southeast Gulf of Mexico in summer 2022, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Dated: June 30, 2022.

Kimberly Damon-Randall,

Director, Office of Protected Resources,

National Marine Fisheries Service.

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